

# E85 Storage and Dispensing



Iowa Department of Natural Resources  
Underground Storage Tank Section



# IOWA'S OIL FIELD

# Iowa DNR Tank Section

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## □ Mission

- to prevent releases from UST systems through regulations, outreach, inspections and enforcement
- Implement highest standards of monitoring and cleanup for those sites where releases have occurred (RBCA)

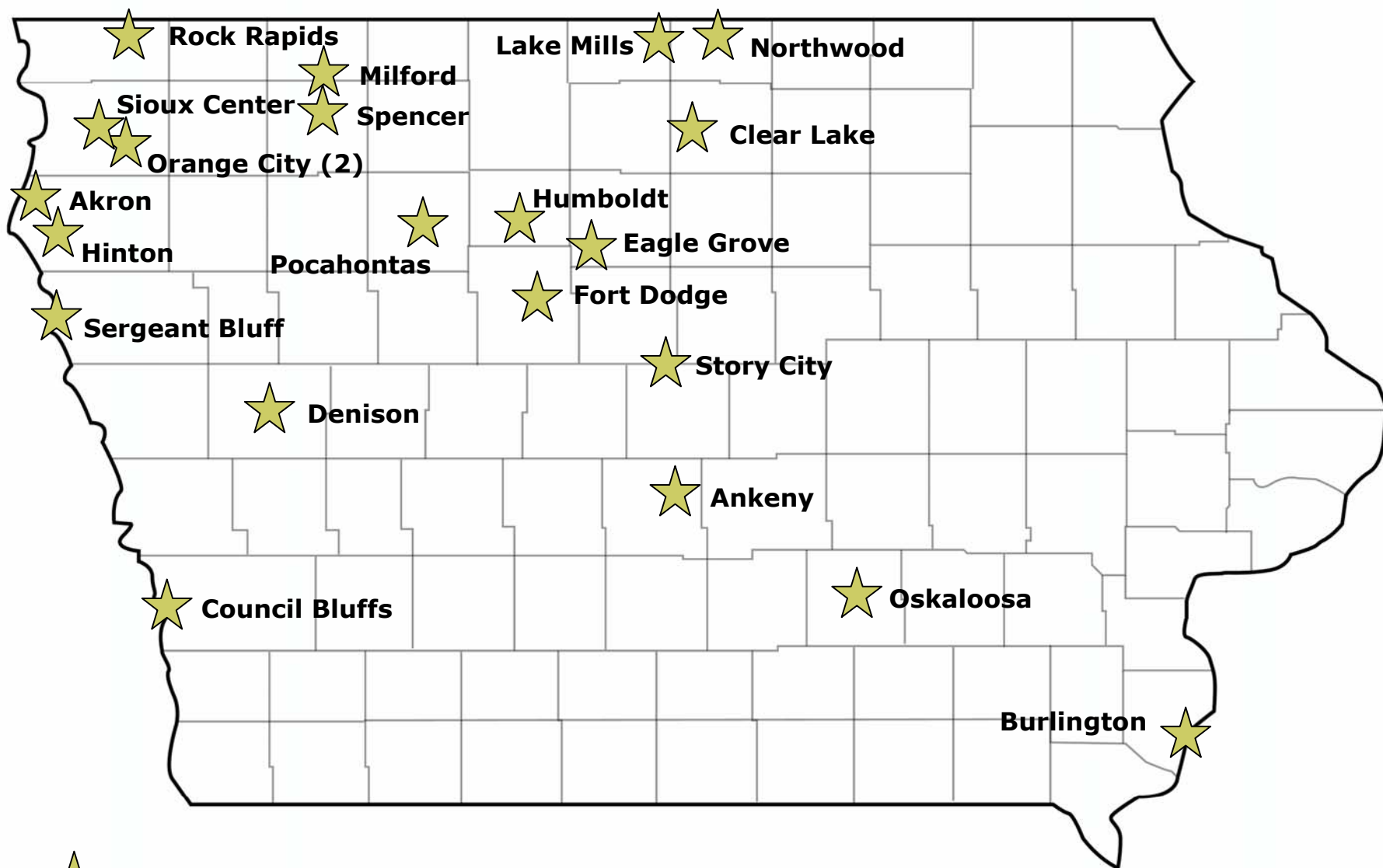
## □ Responsibility

- Regulate 7,800 tanks at 3,000 sites
- 1,800 active LUST sites
- 6,000 LUST sites total

# Where are the E85 Sites?







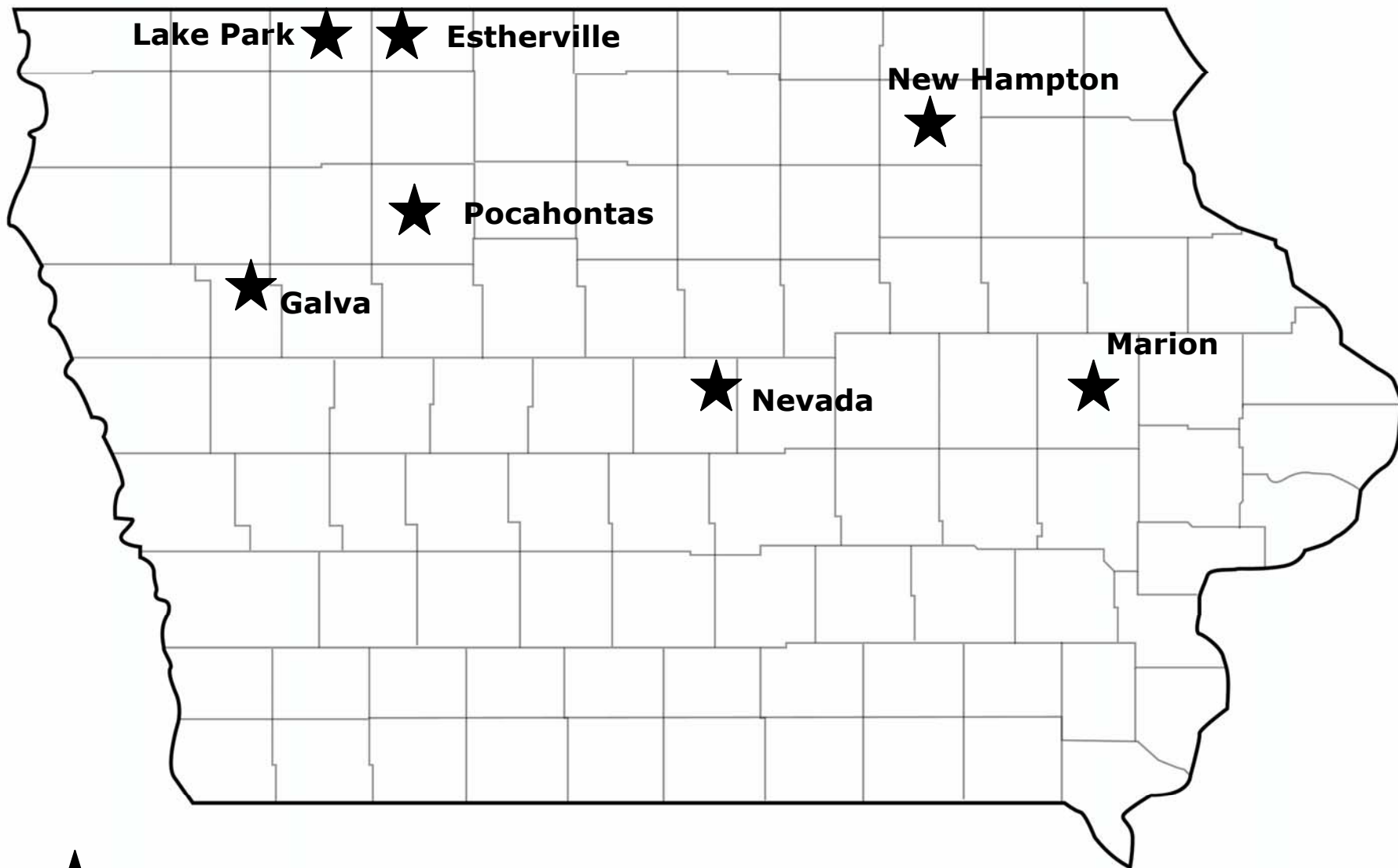
**Private retail marketers using USTs to store E85**



MIDWEST  
FARMERS  
COOP  
ORANGE CITY



WHERE THE  
FARM-TO-FOOD  
SYSTEM BEGINS



**Private retail marketers using ASTs to store E85**



SOLD  
HERE

Clean-Air Fuel Choice

**E85**  
85% Ethanol

For Flexible Fuel Vehicles

**E85**  
85% Ethanol

FLAMMABLE  
NO SMOKING

For Flexible Fuel Vehicles Only

**E85**  
85% Ethanol

**E85**  
85% Ethanol

FLAMMABLE  
NO SMOKING

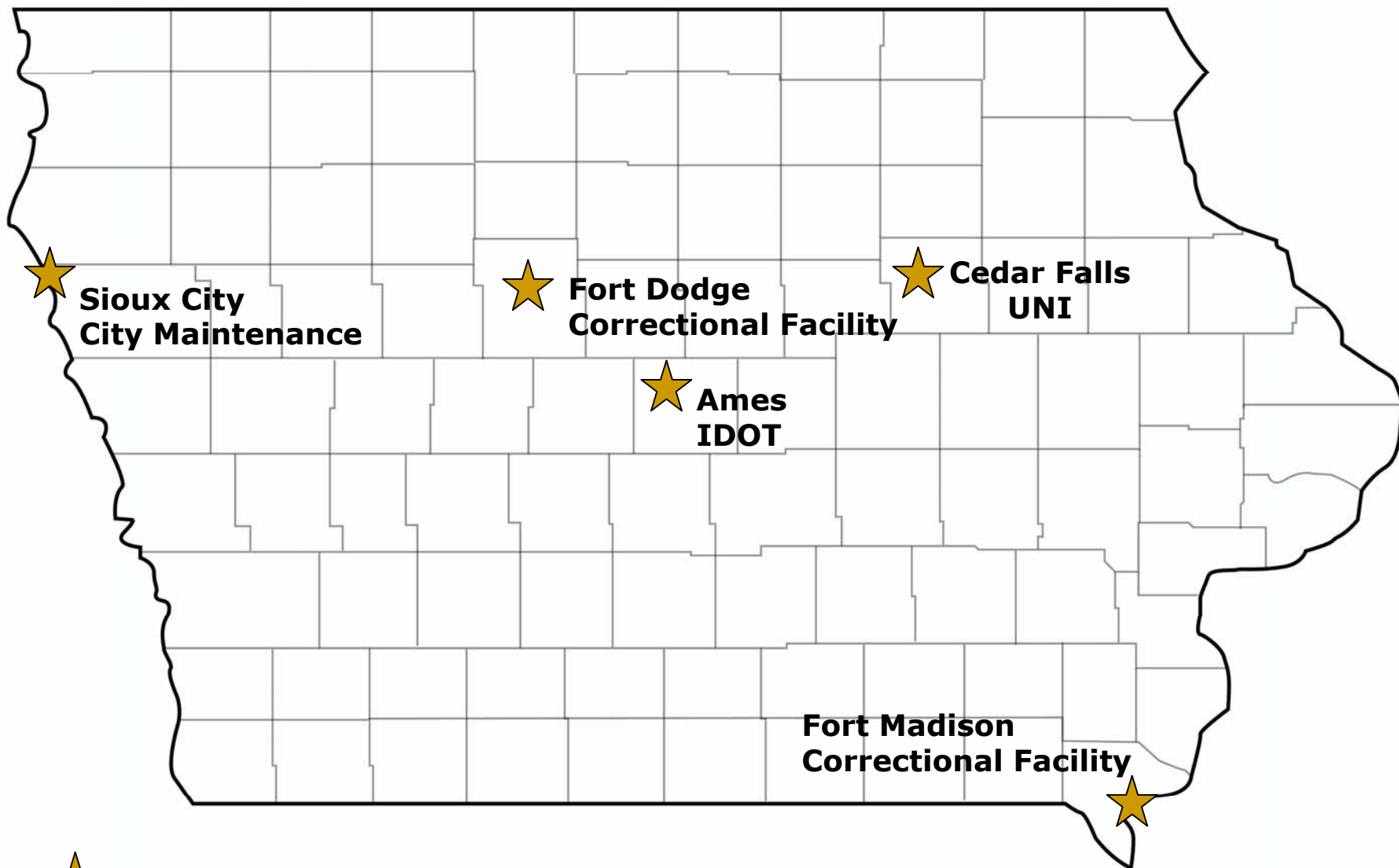
CHEVROLET

374 BQR









**Municipal, County, State Sites using ASTs to store E85**



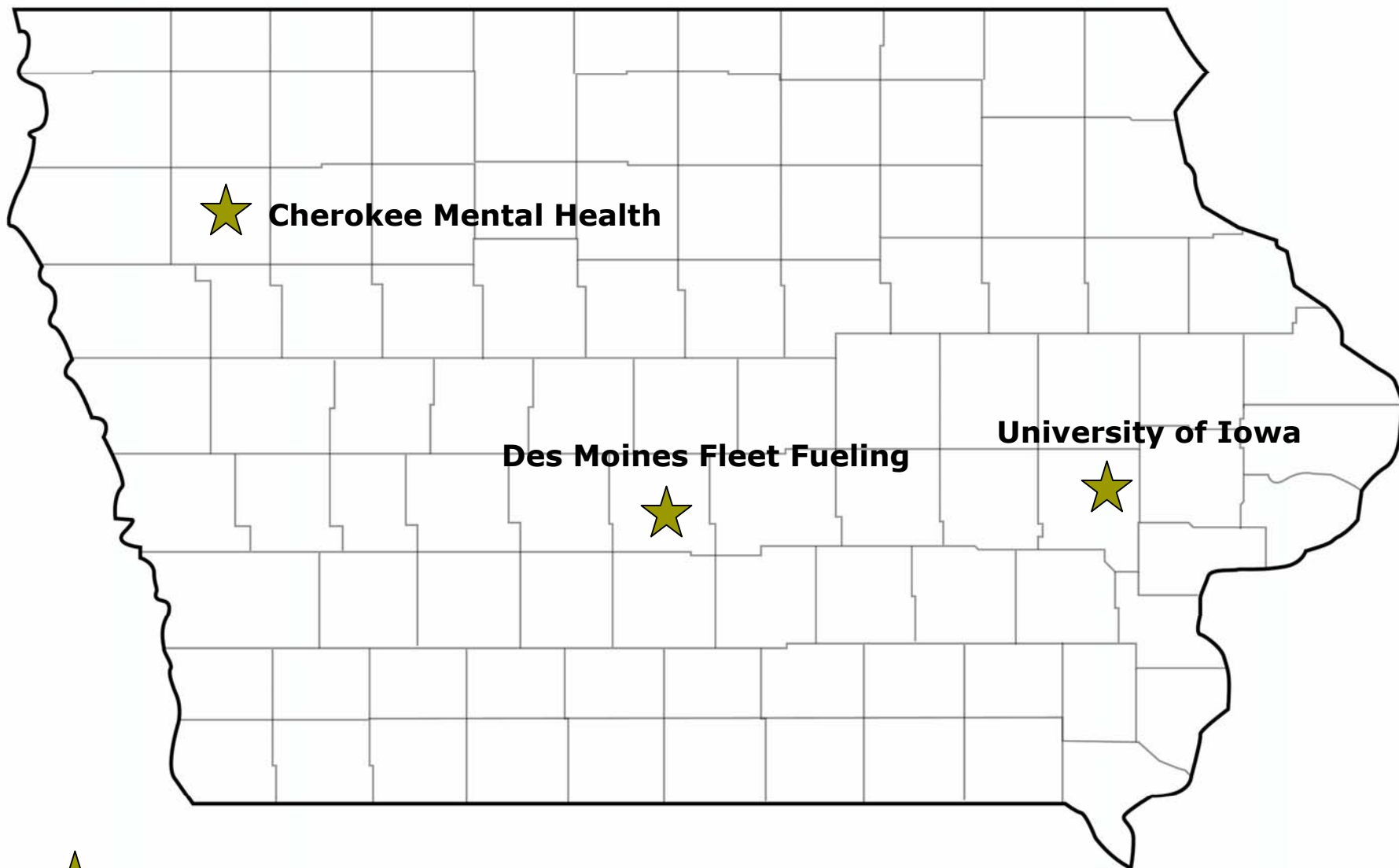
EMERGENCY VENT

DUAL 1000 GALLON



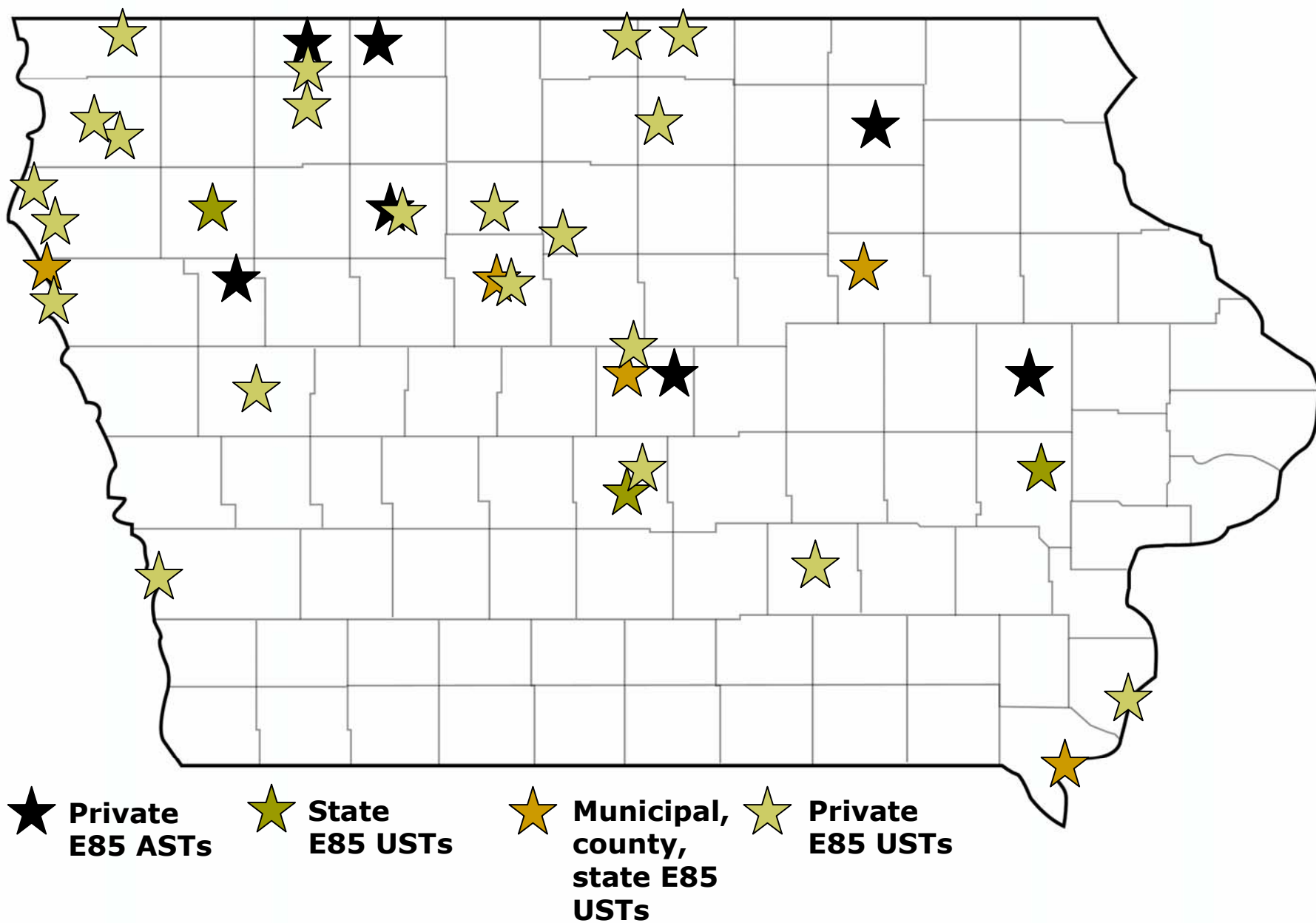


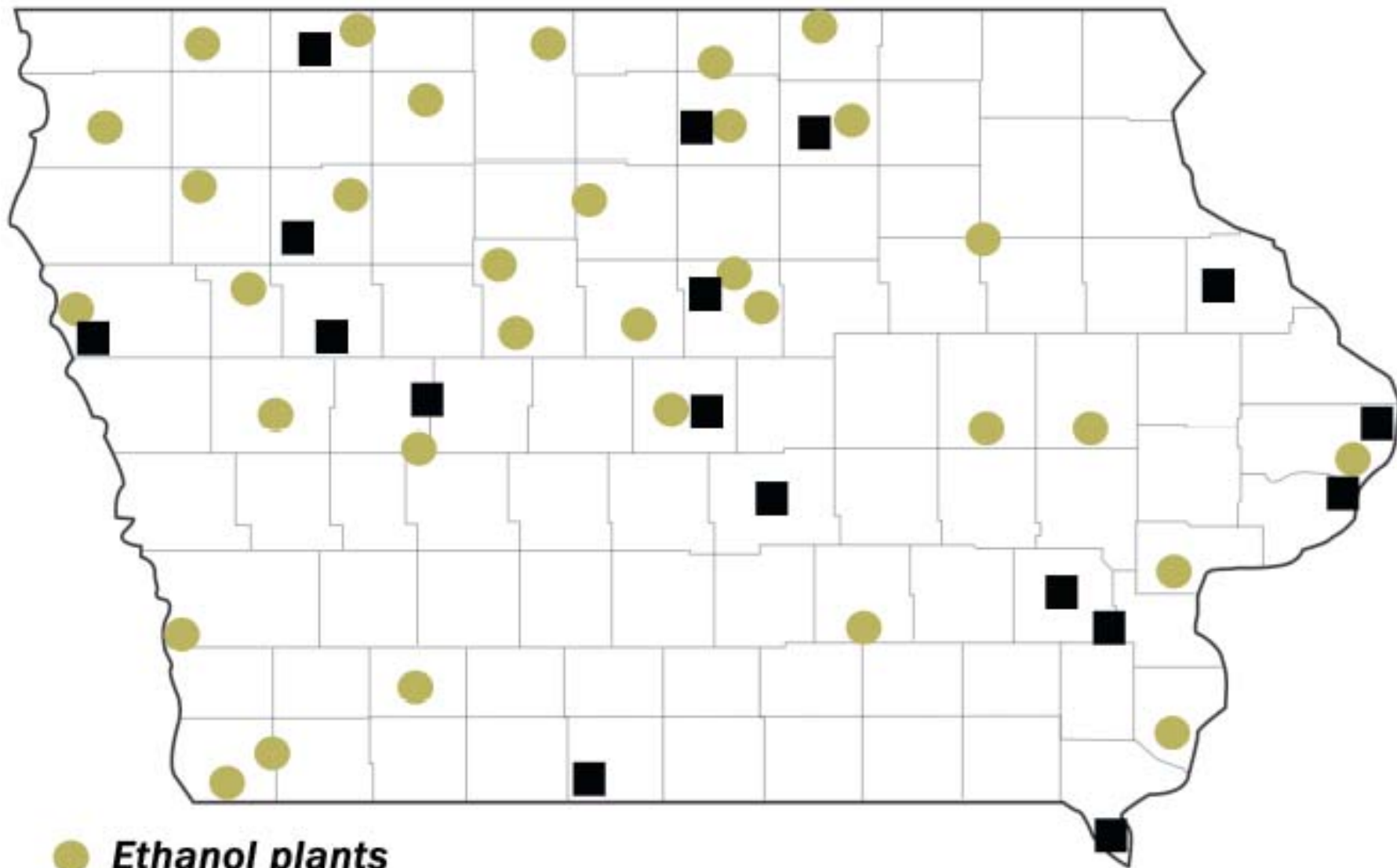




**State sites using USTs to store E85**







● *Ethanol plants*

■ *Biodiesel plants*











# Air Inspections



# Unpermitted Wastewater Basin

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# Prohibited Discharge into a Stream



# DNR and E85

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- ❑ Assist owners/operators to expand the use of E85 while providing protection to the environment and public
- ❑ About 100,000 flexible fuel vehicles in Iowa (about 5 percent of all Iowa vehicles)
- ❑ Provides oxygen for more efficient burn of fuel
- ❑ Lower carbon monoxide and carbon dioxide emissions than gas fueled vehicles (FFVs)



# Reduce Oil Imports

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# E85 Issues and Concerns

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- ❑ Corrosivity
  - Ethanol can scour corrosion cells inside a tank causing a release.
  
- ❑ Conductivity
  - E85 conducts electricity
  - Gasoline is an electrical insulator









# E85 Issues and Concerns

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## ❑ Incompatible Metals

- Aluminum
- Brass
- Copper Alloys
- Lead
- Lead Solder
- Zinc
- Plated steel (lead-tin alloy) orterne plated

# E85 Issues and Concerns

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## □ Compatible Metals

- Carbon steel
- Bronze
- Stainless steel  
(nozzles, drop tubes, fittings, connectors)
- Unplated steel (tanks)
- Black iron (pipe, fittings, connectors)

# E85 Issues and Concerns

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## □ Phase Separation

- Ethanol and water are completely miscible
- Gasoline and water are not miscible
- Ethanol blends well with gasoline
- Water/Ethanol will phase separate from the gasoline once enough water is present in the tank

# E85 Issues and Concerns

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## □ Compatibility

- There are compatibility issues between E blend fuels and system metals and non-metals

## □ Incompatibility: changes in

- physical
- chemical or
- mechanical properties of a material or substance



# Compatibility

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- ❑ UST system components and equipment were optimized for other fuels, namely *gasoline* and *diesel*.

# Compatibility

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- ❑ Compatibility [Subrule 567-135.4(3)]
- ❑ *Owners and operators must use a system made of or lined with materials that are compatible with the substance stored in the UST system*
- ❑ 40 CFR 280.32 (1988)
- ❑ Environmental Code

# Compatibility

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- National Fire Protection Association (NFPA) 30, 2000 Edition
- *The materials of construction for tanks and their appurtenances shall be compatible with the liquid to be stored.*
- Fire Code
- American Petroleum Institute (API) RP 1626
- *All materials in the UST system should be checked for their suitability with ethanol and ethanol blend and replaced as required.*
- Industry Code



# Compatibility

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- ❑ Petroleum Marketers Management Insurance Company (PMMIC)--insures 2,100 UST sites in Iowa
- ❑ UST system components must meet DNR compatibility requirements (Checklist).
- ❑ Must complete PMMIC Compatibility Assessment
- ❑ Incompatible dispensers must have intact dispenser pans

## Contained but Not Intact    No Containment

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# Contained and Intact

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# E85 and Insurability

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- ❑ State Funds
- ❑ Private Insurance
- ❑ Other mechanisms
- ❑ Other options (no underwriting differentiation based on product in tank)
  - Zurich
  - ACE
  - AIG
  - Liberty Mutual

Scott Scheidel, AON Risk Services

# E85 Issues and Concerns

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- ❑ Compatible Elastomers (polymers having the elastic properties of natural rubber)--flexible hoses, seals, gaskets
  - Buna-N (hoses, gaskets)
  - Neoprene rubber (hoses, gaskets)
  - Nitrile rubber (gaskets, O-rings, seals)
  - Teflon
  - Viton (O-rings and seals)

# E85 Issues and Concerns

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## □ Incompatible Elastomers

- Natural rubber
- Cork gasket material
- Neoprene (seals only)
- Buna-N (seals only)
- Urethane rubber

# E85 Issues and Concerns

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- ❑ Compatible Polymers (plastics)
  - Reinforced thermoset plastic (rigid fiberglass) for tanks and piping
  - Thermoplastic (flexible or semi-rigid) used for sumps and flex piping





# E85 Issues and Concerns

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## □ Incompatible Polymers

- Polyurethane
- PVC
- Polyamides (certain manufactured fibers)
- Certain epoxies and polyester resins manufactured between 1970s and 80s
- Alcohol-based thread sealant

# E85 Issues and Concerns

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- ❑ Environmental & Fuel Spill: treated the same as gasoline (NFPA 30 and 30A)
  - Ethanol is a Class 1 Flammable liquid (i.e., Flashpoint below 73° F) with a Flash Point of -20 to -4° F.
  - Ethanol will separate from gasoline when it reaches the water table and cannot be recovered
  - Health & Fuel Toxicity: treated the same as gasoline
  - Safety and Health: treated the same as gasoline

# E85 and its effects on BTEX

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- Three key ways E85 affects BTEX:
  - Cosolvency: BTEX is more soluble in ethanol/water mixtures
  - Interfacial tension: ethanol reduces surface tension of BTEX plume making it more mobile. It can result in the movement of NAPLs. Free phase product may be observed where it hadn't previously been seen.
  - Ethanol can inhibit biodegradation of BTEX by depleting oxygen or other electron acceptors.

# Where Leaks Can Occur

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- ❑ Submersible Pumps - aluminum pump and motor housing. O-rings, gaskets, seals can degrade. Fire safety hazard as well as environmental.





# Where Leaks Can Occur

- ❑ Dispenser Components:
  - Aluminum and copper tubing
  - Unions
  - Valve poppets and seals
  - Gaskets
  - O-rings
  - Hoses
  - Nozzles (no aluminum)
  - Swivels





# Where Leaks Can Occur

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- Leak Detection Monitoring Systems that come in contact with fuel:
  - Aluminum electrical conduit
  - Probes for electrical conduit
  - Epoxy



# Meetings to Develop Checklist and Guidance

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- ❑ Ethanol Industry (producers, marketers, growers)
- ❑ Petroleum Marketers and Convenience Stores of Iowa (PMCI)
- ❑ PMMIC
- ❑ UST Licensed Installers
- ❑ Department of Agriculture (Weights and Measures)
- ❑ Fire Marshal Division



# Compatibility Checklist

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- ❑ Procedure (based on available literature, standards and codes) for converting UST systems to E85
- ❑ Owner/operator and Iowa-licensed installer complete checklist.
- ❑ Iowa Licensed Installer ensures completeness, knowledge (vendors, equipment) and objectivity

# E85 Checklist

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- ❑ Complete equipment checklist for tanks/piping/dispensers
- ❑ Inform insurance carrier. Obtain amended certificate.
- ❑ Check water in tank. No level acceptable
- ❑ Tighten all connections at risers. No vapors escape and no water enters.
- ❑ Clean tank of water and sediment.
- ❑ Label fill ports and paint access covers (API RP 1637). Label dispenser.

# First Delivery (first 7-10 days)

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- ❑ Fill tank to 80 percent capacity and keep as full as possible.
- ❑ Conduct 0.1 gph tightness test of the tank system
- ❑ Test for water daily (alcohol compatible paste or ATG system)
- ❑ Inspect dispenser daily and maintain inspection record
- ❑ Calibrate the dispenser liquid meter to verify meter accuracy

# Ongoing Maintenance

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- ❑ Check regularly for water. No level is acceptable
- ❑ Check calibration of the dispenser liquid meter periodically. Particulate materials in the product may cause excessive wear of the meter, which would require more frequent calibration (API RP 1626)
- ❑ Conduct daily, visual inspections of the dispenser and dispenser pan (if installed) and maintain inspection record.



# Guidance

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- ❑ Prepared guidance based on industry standards, available documents, petroleum experts, and manufacturers.
- ❑ Of primary importance were manufacturers who stated their equipment was or was not compatible.
- ❑ Two-year phase in for dispensers.

# Guidance

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- ❑ Our responsibility was to inform owners/operators and installers regarding the issues of compatibility
- ❑ Developed checklist and conversion guidance for existing UST systems

# Difficulties/Obstacles

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- ❑ Formidable nexus of ethanol investors, marketers, associations, growers, corporations
- ❑ Profit/investor driven
- ❑ Politics (pressure from lobbying groups) and concerns from Governor's office
- ❑ "Don't be different!" Or: "Why are you more restrictive than other states? Why are you tougher on ethanol than gasoline?"
- ❑ "Ethanol is biodegradable! You can drink it!"

# Support/Assistance

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- ❑ Iowa Petroleum Equipment Contractors Association (IPECA)
- ❑ PMMIC
- ❑ Owners/operators
- ❑ Petroleum Marketers and Convenience Stores of Iowa (PMCI)
- ❑ DNR Upper Management
- ❑ Governor's Office



# BioDiesel

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- ❑ No significant compatibility issues with B20 (BioDiesel Handling and Use Guidelines)
- ❑ Physical and chemical properties similar to petro-based diesel

# Legislation

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## □ **E85 Proposed**

- \$2 million grant program for purchases of compatible UST equipment administered by DNR
- 10 percent ethanol mandate by January 2007
- Income tax credit for selling E85 of 10 cents per gallon from 2007-2012
- Sales of flex fuel and hybrid vehicles exempted from use tax

# Legislation

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## □ E85 Current

- Forgivable Loan Program
- Provides \$325,000 annually (for three years) on a cost share basis for new and existing E85 retail sites and on-site or off-site biodiesel terminal locations.
  - New sites--not to exceed \$20,000 per location
  - Existing sites--not to exceed \$7,500 per location
  - Biodiesel off-site storage--not to exceed \$50,000 per location
- 15 sites received ~ \$275,000 for FY '06.



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